

CLAIMS

What is claimed is:

1. A semiconductor device, comprising:
 - a first semiconductor package having a first semiconductor chip mounted therein;
 - a second semiconductor package having a second semiconductor chip mounted therein;
 - a protruding electrode bonding the first semiconductor package to the second semiconductor package so that the second semiconductor package is held above the first semiconductor chip; and
 - resin provided between the first semiconductor package and the second semiconductor package, at least a part of a surface of the first semiconductor chip being spaced apart from the resin.
2. The semiconductor device according to claim 1, wherein the protruding electrode comprises a solder ball.
3. The semiconductor device according to claim 1, wherein the resin is arranged between the first semiconductor package and the second semiconductor package and spaced apart from the protruding electrode.
4. The semiconductor device according to claim 3, wherein the resin is arranged only at corners of the second semiconductor package.

5. The semiconductor device according to claim 3, wherein the resin contacts a selected region of the first semiconductor package and the second semiconductor package, the selected region being spaced apart from the protruding electrode.

6. The semiconductor device according to claim 1, wherein the resin is arranged so as to contact a periphery of the protruding electrode.

7. The semiconductor device according to claim 6, wherein the resin includes flux.

8. The semiconductor device according to claim 1, wherein:

the first semiconductor package comprises:

a first carrier substrate; and

the first semiconductor chip which is flip-chip mounted on the first carrier substrate; and

the second semiconductor package comprises:

a second carrier substrate mounted on the first carrier substrate through the protruding electrode so as to be held above the first semiconductor chip;

the second semiconductor chip which is mounted on the second carrier substrate; and

a sealing agent that seals the second semiconductor chip.

9. The semiconductor device according to claim 8, wherein the first semiconductor package comprises a ball grid array where the first semiconductor chip is flip-chip mounted on the first carrier substrate, and the second semiconductor package comprises one of a ball grid array and a chip-size package where the second semiconductor chip mounted on the second carrier substrate is mold-sealed.

10. An electronic device, comprising:

a first package having a first electronic component mounted therein;

a second package having a second electronic component is mounted therein;

a protruding electrode bonding the first package and the second package so that the second package is held above the first electronic component; and

resin provided between the first package and the second package, at least a part of a surface of the first electronic component being spaced apart from the resin.

11. An electronic apparatus, comprising:

a first semiconductor package having a first semiconductor chip mounted therein;

a second semiconductor package having a second semiconductor chip mounted therein;

a protruding electrode bonding the first semiconductor package to the second semiconductor package so that the second semiconductor package is held above the first semiconductor chip;

resin provided between the first semiconductor package and the second semiconductor package, at least a part of a surface of the first semiconductor chip being spaced apart from the resin;

a motherboard mounting the first semiconductor package bonded to the second semiconductor package; and

an electronic component bonded to the first semiconductor chip and the second semiconductor chip through the motherboard.

12. A method of manufacturing a semiconductor device, comprising:

bonding a first semiconductor package having a first semiconductor chip mounted therein to a second semiconductor package having a second semiconductor chip mounted therein through protruding electrodes; and

providing resin between the first semiconductor package and the second semiconductor package, at least a part of a surface of the first semiconductor chip being spaced apart from the resin.

13. The method of manufacturing the semiconductor device according to claim 12, wherein the resin is arranged between the first semiconductor package and the second semiconductor package so as to be spaced apart from the protruding electrode.

14. The method of manufacturing the semiconductor device according to claim 13, wherein the resin is arranged only at corners of the second semiconductor package.

15. A method of manufacturing a semiconductor device, comprising:
providing flux, which contains resin, on lands formed on a first semiconductor package;

arranging solder balls, provided on a second semiconductor package, on lands provided with the flux; and

melting the solder balls to bond the solder balls to the lands by executing a reflow process while making the resin contained in the flux crawl up along surfaces of the solder balls.

16. A semiconductor device, comprising:
a first semiconductor package including a semiconductor chip;
a protruding electrode bonded to the first semiconductor package;
a second semiconductor package bonded to the protruding electrode opposite the first semiconductor package, the second semiconductor package being held above the semiconductor chip and defining a gap between the second semiconductor package and the first semiconductor package; and

resin spanning between the first semiconductor package and the second semiconductor package, the resin being laterally spaced apart from the semiconductor chip so that at least a part of the gap is free of the resin.

17. The semiconductor device of claim 16 wherein the resin surrounds a periphery of the protruding electrode.

18. The semiconductor device of claim 16 wherein the resin is spaced apart from the protruding electrode.

19. The semiconductor device of claim 18 wherein the resin is located inboard the protruding electrode relative to the semiconductor chip.

20. The semiconductor device of claim 18 wherein the resin is located outboard the protruding electrode relative to the semiconductor chip.

21. The semiconductor device of claim 16 wherein the resin is confined to corners of the second semiconductor package.

22. The semiconductor device of claim 16 further comprising second resin spanning between the semiconductor chip and the second package.